

### REMARKS

This reply is accompanying a Request for Continued Examination.

Claims 1, 2, 4-6, 8-15, and 17-20 are pending in the application. Claims 10 and 19 are canceled. Claim 1 is amended to incorporate several types of carbide compositions cited in the published specification, paragraph [0015], and to incorporate a minimum temperature difference between the first and second temperature, as illustrated in Figures 1 and 2. No new matter is added by these amendments. Applicants submit that these amendments do not require any additional search and request entry and consideration herein, at the very least for purposes of a potential appeal.

Applicants wish to thank the Examiner for the courtesy extended to his undersigned representative, Dr. Thomas Dekleva, during their teleconference interview of November 9, 2010. During that interview, Examiner Hendrickson indicated his willingness to entertain specific data generated according to the descriptions within the disclosures, in support of narrowed claims. Accordingly, Applicants include a declaration by Dr. Yuri Gogotsi, one of the named inventors, describing the results of experiments conducted according to the descriptions of the disclosure. This declaration describes the results of experiments in which the various carbides described in currently presented claim 1 were reacted with halogen gas at various chlorination temperatures, resulting in the incremental nanopore size distributions described in currently presented claim 1. Applicants believe this disclosure represents sufficient support for the claims as presented, and that this support does not constitute new matter as the experiments were conducted according to the teaching of the as-filed specification.

In this Office Action, the Examiner cites four references as the bases for rejections, and for three of them reiterates near verbatim language to fashion the rejections. Before addressing the individual specific rejections made in this action, Applicants wish to go on record once more with regard to several general comments made by the Examiner in this and preceding office actions, as related to failure to meet the proper standards which in making rejections based on obviousness, including the failure to articulate the specific bases for his obviousness rejections, and the failure to address with particularity the declaration made by the inventor. These points apply to all of the obviousness rejections currently pending.

**In the Opinion of Applicants, the Examiner Has Failed to Articulate Even a *Prima Facie* Case of Obviousness With Any of the Pending References**

According to MPEP § 2143 and *In re Vacck*, 947 F.2d 488, 20 USPQ2d 1438, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the reference itself or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicants' disclosure.

The file history of the present application (including the present and the previous four office actions) shows a lack of *any* analysis based on the Graham factors, despite repeated objections on this point from the Applicants. Instead, the Examiner provides generalized conclusory statements that the invention would have been obvious, without explaining why. Applicants submit that this failure to apply the proper analytical framework has led to an erroneous conclusion by the Examiner in at least two ways.

First, in the present application, Applicants have provided evidence, by virtue of sworn declaration, that the person of ordinary skill in the art believed that "subjecting a given carbide composition to halogenation at elevated temperatures would provide a limited series of discrete nanoporous compositions whose nanopore sizes varied by discrete 'jumps' (or quanta), the distances of those 'jumps' associated with the distance between graphitic layers; i.e., ca. 0.3-0.4 nm, such that the available pore sizes for a given carbide composition was limited to a finite number of pore sizes by the nature of the original carbide composition" (Declaration, paragraph 10). The Examiner has provided no evidence which counters or contradicts this evidence and, in fact, has instead appears to have chosen to ignore this evidence. In doing so, he has failed to explain why one skilled in the art would have been motivated to even try to achieve the present invention or why he or she would have had any reasonable expectation of success, in the face of

the conventional wisdom at the time that it was not possible to achieve such results, as averred by the Applicant.

Second, in the present (and previously applied) office actions, not a single reference cited by the Examiner describes an ability to provide variations in the range of about 0.05 to about 0.2 nm to achieve a nanopore size within about 0.05 to about 0.2 nm from a targeted pore size, as described in the currently pending claims. The Examiner admits as much in stating (twice in the pending office action) that “the claimed verbiage is not taught [by the cited reference].”

**In the Opinion of Applicant, the Examiner Has Failed to Provide Articulated Reasoning on the Record.**

According to the MPEP § 2143, “The key to supporting any rejection under 35 U.S.C. 103 is the *clear articulation* of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR* noted that the analysis supporting a rejection under 35 U.S.C. 103 *should be made explicit*.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418, (2007); *In re Kahn*, 441 F.3d 988, cited with approval in *KSR*, at 418: “[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead there *must be some articulated reasoning* with some rational underpinning to support the legal conclusions of obviousness.” *In re Zurko*, 258 F.3d 1379 (Fed. Cir. 2001) (“With respect to core factual findings in a determination of patentability, the Board of Patent Appeals and Interferences of the United States Patent and Trademark Office *cannot simply reach conclusions based on* its own understanding or experience, or on *its assessment of what would be basic knowledge or common sense*. Rather, the Board must point to some concrete evidence in the record in support of these findings.”). MPEP 2142 similarly requires: “With regard to rejections under 35 U.S.C. 103, the examiner must provide *evidence* which as a whole shows that the legal determination sought to be proved (i.e., the reference teachings establish a *prima facie* case of obviousness) is more probable than not.” Applicants submit that in none of the rejections based on 35 U.S.C. §103 has the Examiner provided *any evidence*, or even any *arguments with particularity*, that support the conclusions of obviousness.

**In the Opinion of Applicants, the Examiner Has Failed to Consider All of the Evidence**

Applicants submit that the Examiner has failed to consider all of the evidence as required by Federal Circuit case law. In particular, he has failed to explain why he has chosen to ignore the Applicant's Declaration as to the state of the art at the time of filing and the technology available in terms of controlling the temperatures in processing the invention.

The Federal Circuit, in *In re Sullivan*, 498 F.3d 1345, 1351 (Fed. Cir. 2007) vacated a finding of obviousness because the Board "failed to give any weight to the rebuttal evidence of record." (When a patent applicant puts forth rebuttal evidence, the Board *must consider* that evidence)(emphasis added). See also *Lindemann Maschinenfabrik GMBH v. American Hoist and Derrick Co.*, 730 F.2d 1452, 1461 (Fed. Cir. 1984) ("All evidence must be considered *before* a conclusion on obviousness is reached.") (as recently cited in *B-K Lighting, Inc. v. Fresno Valves & Castings, Inc.*, 375 Fed. Appx. 28 (Fed. Cir. April 28, 2010)). Recent USPTO Guidelines also teach that "*all evidence*, including evidence rebutting a *prima facie* case of obviousness, *must be considered* when properly presented."

**I. Claim Rejections under 35 U.S.C. §103(a) – the Leis reference**

Claims 1, 4-6, 8, 9, 11-15, 17, 19, and 20 stand rejected under 35 U.S.C. §103(a), as being allegedly obvious over Leis J., *et al.*, "Carbon nanostructures produced by chlorinating aluminum carbide," *Carbon*, 2001, 39, 2043-2048 (hereinafter "the Leis reference"). Applicants continue to traverse this rejection on the basis that the Examiner has failed to articulate the basis for the rejection, for reasons provided in past responses and as described above.

The specific statement by the Examiner that, "the claims (other than 20) read upon an attempt to duplicate and experiment but having a small but unavoidable minor temperature fluctuation between runs," directly contradicts, without evidence, the claims as amended ("reproducibly produced" of claim 1) and the Declaration provided by the Applicant.

Not only does the single Leis reference fail to teach or suggest all the claim limitations of the rejected claims, but it also provides no suggestion that it was possible to achieve the levels of control described in the instant invention, nor any motivation for even attempting to achieve the

presently described invention. As such, it provides no support for a *prima facie* case of obviousness as a matter of law.

While Applicants continue to traverse this rejection, in an effort to advance prosecution, claim 1 is amended to include specific carbides, none of which is aluminum carbide, thereby mooted this rejection. Accordingly, Applicants request reconsideration and withdrawal of this rejection. Applicants reserve the right to reinstate the previous subject matter in a later amendment or in a subsequent continuation application.

II. **Claim Rejections under 35 U.S.C. § 103(a) – the Leis and El-Raghy references**

Claims 1, 2, 4-6, 8-15, and 17-20 stand rejected under 35 U.S.C. § 103(a), as being allegedly unpatentable over the Leis reference, taken with El-Raghy, *et al.*, *J. Appl. Phys.*, 1998, 83(1): 112-119 (hereinafter “the El-Raghy reference”). Applicants traverse this rejection as well for the reasons provided above as well as those previously made of record.

To the extent that the Leis reference fails to teach or suggest all the claim limitations of the rejected claims, the El-Raghy reference cures none of these deficiencies. The El-Raghy reference merely describes the existence of  $\text{Ti}_3\text{SiC}_2$  and provides no suggestion that it was possible to achieve the levels of control described in the instant invention, nor any motivation for even attempting to achieve the presently described invention. With no direction to achieve the invention described herein, or even a knowledge that the present invention was possible, it cannot be said that it would have been obvious to combine the teachings of the Leis and El-Raghy references and achieve the instant invention. Even if one might have been tempted to combine these references, there is nothing in either to give the skilled artisan any reason to expect that this material would act as described according to the claims herein.

Accordingly, Applicants submit that the Examiner has failed to establish a *prima facie* case for obviousness, and the Applicants respectfully request reconsideration and withdrawal of this rejection.

III. **Claim Rejections under 35 U.S.C. §103(a) – the Boehm reference**

Claims 1, 4-6, 8-15, 19, and 20 stand rejected under 35 U.S.C. 103(a), as allegedly obvious over Boehm, *et al.*, Proc. 12<sup>th</sup> Biennial Conf. on Carbon, 1975, pp. 149-150 (hereinafter “the Boehm reference”). Applicants traverse this rejection as well, for the same reasons as previously presented for the Leis and El-Raghy references, both above and previously.

According to the Examiner, the Boehm reference “[p]age 149 teaches narrow-pore distribution carbon made from reacting TaC with [sic] at 500C. The results of several different temperatures are plotted and correlated.” However, and as stated in Applicant’s last response to this same basis of rejection, the discussion on page 149 is limited to that of changes in crystallographic cell parameters, a feature not contained or correlated with nanopore size of the rejected claims. Even to the extent that page 150 (Figure 2) of Boehm describes pore volume, it does not describe nanopore diameter, as described in these claims. As such, Boehm does not show “each and every element as set forth in the claim,” and as such, fails the all-elements test for obviousness (i.e., the prior art reference must teach or suggest all the claim limitations. MPEP § 2143, *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438).

Again, while the Applicants continue to traverse this rejection, in an effort to advance prosecution, claim 1 is amended to include specific carbides, none of which is tantalum carbide, thereby mooting this rejection. Accordingly, Applicants request reconsideration and withdrawal of this rejection. Applicants reserve the right to reinstate the previous subject matter in a later amendment or in a subsequent continuation application.

IV. **Claim Rejections under 35 U.S.C. §103(a) – the Mohun reference**

Claims 1, 4, 6, 8-14, 17, 19, and 20 stand rejected under 35 U.S.C. 103(a), as allegedly obvious over U.S. Patent 3,066,099 (hereinafter “the Mohun reference”). Applicants traverse this rejection as well, for the same reasons as previously presented for the Leis, El-Raghy, and Boehm references, as well as those comments made in the introductory remarks.

Specifically, the Examiner remarks that “[t]he reference teaches, especially in col. 6, 10, 35, and 36 heating SiC with chlorine at various temperatures to make a microporous material.

No difference is seen in the pore distribution.” (Office Action dated 6/16/10, page 3, 2<sup>nd</sup> paragraph).

Even to the extent that the Mohun reference may describe microporous materials having *individual* pore distributions similar to those described in the present invention, Applicants are unable to identify any teaching within this reference which would suggest the limitations of any of the claims currently rejected, nor suggestion that it is worthwhile or possible to achieve them. In the absence of such teaching, Applicants request reconsideration and withdrawal of the rejection.

### **Conclusion**

Applicants believe that the foregoing constitutes a complete and full response to the Office Action of record. Applicants respectfully submit that claims 1, 2, 4-6, 8-9, 11-15, 17-18 and 20 are in condition for allowance and entry of the present amendments and notification to that effect is earnestly requested.

Date: February 4, 2010

/Thomas W. Dekleva/

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